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CLEVELAND, OH 44114				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/508,735

Applicant(s)

BECKER ET AL.

Examiner

CHRISTINE CHEN

Art Unit

1793

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 April 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 18, 21-25, 29, and 36-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 18, 21-25, 29 and 36-47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/06)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Status of Claims

Claims 18, 21-25, 29, 36-47 are pending wherein claims 1-17, 19-20, 26-28, 30-35 are canceled.

Status of Previous Rejections

The previous rejection of claims 20-21, 23, 30, and 32 under 35 U.S.C. 112, second paragraph is withdrawn. The previous rejection of claims 18, 21-22, and 27-29 under 35 U.S.C. 103(a) as being unpatentable over Paul (GB 2162294) in view of Edenhofer (US 5722825) and Reuter (US 5035405) is withdrawn. The previous rejection of claims 19, 20 and 23 under 35 U.S.C. 103(a) as being unpatentable over Paul (GB 2162294) in view of Edenhofer (US 5722825) and Reuter (US 50355405) and further in view of Mahr (US 3693812) is withdrawn. The previous rejection of claims 24-26 under 35 U.S.C. 103(a) as being unpatentable over Paul (GB 2162294) in view of Edenhofer (US 5722825) and Reuter (US 5035405) and further in view of Myers (US 2892744) is withdrawn. The previous rejection of claims 31-34 under 35 U.S.C. 103(a) as being unpatentable over Paul (GB 2162294) in view of Edenhofer (US 5722825) and Hohne (US 4622006) is withdrawn. The previous rejection of claim 35 under 35 U.S.C. 103(a) as being unpatentable over Paul (GB 2162294) in view of Edenhofer (US 5722825), Hohne (US 4622006) and Reuter (US 5035405) is withdrawn.

Claim Rejections - 35 USC § 103

Art Unit: 1793

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 18, 21-22, and 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Manfred (GB 2162294) combined with Barkman (WO 86/02103).

With regards to claim 18, Manfred discloses a rotary hearth 4 (Figure 3) or 24 (Figure 1) driven stepwise (examiner interprets this as being rotated in a timed manner) and comprising outer wall 1 and inner wall 2 (examiner interprets their functionality of limiting the chamber would be inherent), wherein the furnace has vertically raisable partitions 9-12 which divide the hearth into a heating up zone 17 and a carburization 18 and diffusion annealing zone 19 (examiner interprets these as more than one treatment zone); an aperture 17 for loading is provided (given that the heating up zone 17 is arranged first in the direction of rotation, examiner interprets said aperture for charging the heating zone), furnace flap 7 is provided for closing the aperture, and a partition 9 (charging sluice) is fitted immediately behind (adjacent) the aperture and is at right angle to the opening. Additionally industrial robots are utilized in the transportation of workpieces into and out of the furnace (see abstract, page 2 paragraph 4, page 3 paragraph 1, page 4 paragraph 1, 3, 4 and 7 and Figures 2 and 3).

Manfred does not disclose a second opening, a closing for the second opening, a quenching bath, or a sluice arrangement connecting the second opening to the quenching bath.

However, with regards to the second opening and a closing for the second opening, Manfred discloses it is well known in the art to utilize separate apertures and/or flaps for loading the furnace and/or for removing the treated stock (see page 1 paragraph 3).

With regards to the quenching bath and sluice arrangement, Barkman discloses a heat treatment installation. In a particular example, Barkman discloses a rotating hearth carbonization furnace comprising a quenching oil bath 12 (given its placement after the exit lock 9, examiner interprets said bath to be for quenching the workpieces after treatment in said rotary hearth furnace); and a lock 11 (sluice) connected to oil bath 12 (examiner interprets the lock as connecting the exit opening (prior to exit lock 9) and oil bath 12 wherein the lock 11 has two sluice doors and wherein one of the sluice doors is at about a right angle to the exit lock 9 connecting (shown in the Figure) (see page 4 paragraph 3-page 5 paragraph 1 and Figure).

It would have been obvious to one of ordinary skill in the art to modify Manfred's rotary hearth with a second opening and closure as is well known in the art in order to facilitate treatment in a streamlined fashion and to utilize a second means for closing said second opening in order to separate the difference in temperature and atmospheric conditions of the last heat treatment zone and the outside conditions. Additionally, it would have been obvious to one

Art Unit: 1793

of ordinary skill in the art to modify Manfred's rotary hearth with the quenching bath and sluice arrangement disclosed in Barkman in order to facilitate immediate subsequent rapid cooling of the workpieces upon the completion of heat treatment allowing for the strengthening of the workpieces.

With regards to the placement of the two openings as recited in claim 21, Manfred does not disclose two openings which are disposed at a circumferential distance of about 45° from each other.

However, as discussed previously, it would be obvious to one of ordinary skill in the art to set the two openings such that they are wider than being "juxtaposed at close intervals" to facilitate alleviating the temperature difference between the start and end treatment zones. Moreover, the rearrangement of parts in terms of the positioning of the two openings is not held to be patentable. See MPEP 2144.04 VI Part C.

With regards to the functionality of the two openings as required in claim 22, Manfred does not disclose two openings wherein both are provided as charging and discharging openings.

However, the single aperture disclosed in Manfred is provided as a loading and unloading aperture (see page 1 paragraph 2). Moreover, it would have been obvious to one of ordinary skill in the art that the modified rotary hearth of Manfred by the well known second opening and means for closing said opening and by the quenching bath and sluice arrangement of Barkman to utilize the two openings as both charging and discharging openings in order to allow for increased flexibility in terms of the use of the rotary hearth.

Additionally, while Manfred does not disclose two openings wherein both are provided as charging and discharging openings, the modified rotary hearth of Manfred with the well-known second opening and means for closing said opening and with the quenching bath and sluice arrangement of Barkman is *capable* of the functionality wherein both openings are provided as charging and discharging openings. Moreover, the use of the apparatus (i.e. the two openings as charging and discharging openings) does not impart any patentable weight towards the structure of the apparatus (i.e. installation for the heat treatment of parts) itself.

With regards to the second quenching means required by claims 24 and 25, neither Manfred nor Barkman disclose a second quenching means connected to the rotary hearth furnace by means of a sluice.

However, the mere duplication of parts has no patentable significance unless a new and unexpected result is produced. See MPEP 2144.04 VI part B.

3. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Manfred (GB 2162294) with Barkman (WO 86/02103) in view of Kuehn (DE 19919738 Machine Translation).

With regards to the elevator sluice arrangement recited in claim 23, while Manfred teaches an aperture for charging, Manfred does not disclose its disposal vertically above the furnace chamber. However, the rearrangement of parts in terms of the placement of the opening is not held to be patentable. See MPEP 2144.04 VI Part C.

Neither Manfred nor Barkman disclose an opening coupled to a charging elevator sluice disposed vertically above the furnace chamber.

Kuehn, in disclosing a continuous furnace, discloses an air-lock 5 provided with a transport device 8 (elevator sluice) wherein the air-lock follows the hearth furnace 3 (examiner interprets this as discharge opening 4 of the hearth furnace 3 coupled to a charging elevator sluice) (see page 3 paragraph 5 and Figures 1 and 2). In terms of the positioning of the sluice, Kuehn does not disclose its placement vertically above the furnace chamber. However, the rearrangement of parts in terms of the placement of the sluice vertically above the furnace chamber is not held to be patentable. See MPEP 2144.04 VI Part C.

It would have been obvious to one of ordinary skill in the art to use the elevator sluice of Kuehn in the rotary hearth of Manfred modified by the well known additions of a second opening and means for closing said opening and the quenching bath and sluice arrangement of Barkman in order to facilitate the automated transportation of the workpieces into the furnace.

4. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Manfred (GB 2162294) with Barkman (WO 86/02103) in view of Yamada (US4496312).

With regards to the doors being individually controllable as recited by claim 29, neither Manfred nor Barkman disclose doors which are individually controllable.

Yamada, in disclosing a heat treatment system, teaches a mechanism 32 for raising or lowering the door 28. The other partition door 29 is also adapted to raise or lower by the same mechanism as for the door 28 (see col. 3 lines 9-26).

Examiner interprets this as the same mechanism utilized for both doors, but wherein said mechanisms are individually operated.

It would have been obvious to one of ordinary skill in the art to utilize the individually controllable doors of Yamada in the rotary hearth of Manfred modified by the well known addition of a second opening and closing and the quenching bath and sluice arrangement of Barkman in order to facilitate flexibility in terms of the number of heat treatment zones available. Given that the doors are utilized to separate different heat treatment zones in Manfred, it would have been obvious to one of ordinary skill in the art to modify the doors to be individually controllable to allow for the possibility wherein there is only one treatment zone, or two treatment zones, etc.

5. Claims 36-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Manfred (GB 2162294) combined with Barkman (WO 86/02103).

A discussion of Manfred's disclosure of a rotary hearth furnace with two walls, a plurality of vertically movable doors and a first closable opening for charging and discharging the furnace is found in paragraph 2 above.

A discussion one why it would have been obvious to modify Manfred's hearth with an additional opening is also found in paragraph 2 above.

Additionally, Manfred discloses the hearth to be rotated in a direction of rotation 14 (see Figure 2). Examiner interprets said direction as being clockwise. Manfred also discloses a heating up zone 17 which is arranged behind the first partition 9 in the direction of rotation, wherein the partition 9 is immediately behind (adjacent) the loading and unloading aperture (see page 4 column 3).

It would have been obvious to one of ordinary skill in the art to modify Manfred's hearth with a second opening in order to facilitate treatment in a streamlined fashion and to place the second opening adjacent the heating up zone as well in order to facilitate the use of the rotatable furnace wherein the furnace is rotatable in both a clockwise and counterclockwise direction.

A discussion on why it would have been obvious to modify Manfred's hearth with the quenching bath and sluice arrangement disclosed in Barkman is found in paragraph 2 above.

It would have been obvious to one of ordinary skill in the art to modify Manfred's rotary hearth with the quenching bath and sluice arrangement disclosed in Barkman in order to facilitate immediate subsequent rapid cooling of the workpieces upon the completion of heat treatment.

With regards to another quenching device in selective communication with the other closable opening, the mere duplication of parts has no patentable significance unless a new and unexpected result is produced. See MPEP 2144.04 VI part B.

With regards to the plurality of transport devices for transporting the parts into or out of the rotary hearth furnace, Manfred discloses industrial robots (plural) as disclosed in paragraph 2 above.

With regards to the placement of vertically movable doors as recited in claim 37, Manfred discloses partitions 9 and 12 (vertically movable doors) respectively fitted on each of the two sides immediately behind (adjacent) the

loading and unloading aperture in order to produce a locklike loading and unloading zone (see page 4 paragraph 3 and Figures 1 and 3).

With regards to the number of carburizing and diffusion zones required in claims 38 and 39, Manfred does not disclose three treatment zones comprising a carburizing zone and two diffusion/carburizing zones.

However Manfred discloses a rotary hearth wherein movable partitions 9 to 12 permit treatment zones with greatly different furnace atmospheres and temperatures, particularly a heating up zone 17, a carburization zone 18 and a diffusion annealing zone 19, wherein the diffusion annealing zone 19 is between the carburization zone 18 and the heating up zone (see page 4 paragraph 1 and Figures 1 and 3).

It would have been obvious to one of ordinary skill in the art to add another diffusion/carburizing zone to the rotary heart of Manfred modified by the well known second closable opening and quenching device of Barkman in order to increase the number of options in terms of heat treatment sequencing of the workpieces.

With regards to the circumferential distance of the heating zone as recited in claim 40, Manfred does not disclose a heating zone which extends over a circumferential distance of about 90 degrees between the first and second closable openings.

However, given the stepwise rotation of the Manfred hearth, it would have been obvious to one of ordinary skill in the art to space the heating zone according to the time desired for heat treatment in the heating zone.

Art Unit: 1793

Furthermore, Barkman discloses that differing heat treatment conditions are achieved by varying the travel paths and thus the treatment time of the workpiece charges in the rotating hearth furnace (see abstract). Given this disclosure wherein travel path is a result effective variable in terms of heat treatment conditions, it would have been obvious to have a heating zone which extends over the circumferential distance of about 90 degrees between the first and second closable openings through routine optimization.

Additionally, the rearrangement of parts in terms of the positioning of the heating zone between the first and second openings is not held to be patentable. See MPEP 2144.04 VI Part C.

With regards to the cooling oil bath required by claims 41 and 42, Barkman discloses an oil bath as described in paragraph 2 above.

6. Claims 43-47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Manfred (GB 2162294).

A discussion of Manfred's disclosure of a rotary hearth furnace with two walls, a plurality of vertically movable doors and a first closable opening for charging and discharging the furnace is found in paragraph 2 above.

Additional discussion in terms of the clockwise rotation is found in paragraph 5 above.

Additional discussion in terms of a second closable opening and the location of the first and second closable opening can be found in both paragraphs 2 and 5 above.

Additionally, a ring-shaped furnace chamber is found on Figures 1 and 3 of Manfred.

It would have been obvious to one of ordinary skill in the art to modify Manfred's hearth with a second closable opening in order to facilitate treatment in a streamlined fashion and to place the second opening adjacent the heating up zone as well in order to facilitate the use of the rotatable furnace wherein the furnace is rotatable in both a clockwise and counterclockwise direction.

With regards to the placement of vertically movable doors and the first closable opening as required in claim 44, Manfred discloses partitions 9 and 12 (vertically movable doors) respectively fitted on each of the two sides immediately behind (adjacent) the loading and unloading aperture in order to produce a locklike loading and unloading zone (see page 4 paragraph 3 and Figures 1 and 3) as discussed in paragraph 5 above.

With regards to the number of carburizing and diffusion zones required in 45 and 46, Manfred does not disclose three treatment zones comprising a carburizing zone and two diffusion/carburizing zones.

However Manfred discloses a rotary hearth wherein movable partitions 9 to 12 permit treatment zones with greatly different furnace atmospheres and temperatures, particularly a heating up zone 17, a carburization zone 18 and a diffusion annealing zone 19, wherein the diffusion annealing zone 19 is between the carburization zone 18 and the heating up zone (see page 4 paragraph 1 and Figures 1 and 3).

It would have been obvious to one of ordinary skill in the art to add another diffusion/carburizing zone to the rotary heart of Manfred in order to increase the number of options in terms of heat treatment sequencing of the workpieces as discussed in paragraph 5 above.

With regards to the circumferential distance of the heating zone as recited in claim 47, Manfred does not disclose a heating zone which extends over a circumferential distance of about 90 degrees between the first and second closable openings.

However, given the stepwise rotation of the Manfred hearth, it would have been obvious to one of ordinary skill in the art to space the heating zone according to the time desired for heat treatment in the heating zone.

Additionally, the rearrangement of parts in terms of the positioning of the heating zone between the first and second openings is not held to be patentable. See MPEP 2144.04 VI Part C as discussed in paragraph 5 above.

7. Claims 43 and 45-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hagan (US 1362296) combined with Osamu (JP 05-239558).

Hagan discloses a moving heating furnace comprising: a ring-shaped heating chamber formed by inner and outer walls 1 and 2 and two closable openings 21 and 33 disposed in the outer wall of the furnace chamber. The chamber may be moved in a clockwise direction or in reverse (see Figure 1 and page 1 lines 47- 59 and lines 69-74, page 2 line 45-54, page 2 line 124-page 3 line 5, page 3 line 51-60 and page 4 line 17-24), and such openings are capable of being used for charging and discharging.

Hagan does not disclose a plurality of vertically movable doors.

Osamu discloses a traveling hearth type furnace comprising a plurality of vertically movable doors 5 which divide the furnace into different divisions, for example a heating zone and soaking zone. The doors create sections within the divisions, S1-S11, wherein the temperature and atmosphere is individually controlled (see Figure 1, [0003] lines 1-3 of Machine Translation and English abstract).

It would have been obvious to one of ordinary skill in the art to modify Hagan's furnace with the doors of Osama in order to facilitate different heat treatment zones within the furnace. In doing so, the two openings of Hagan would be adjacent to vertically movable doors.

With regards to the treatment zones required by claim 45, as disclosed previously, Osamu teaches the use of vertically movable doors in order to create different heat treatment zones. Given Osamu's disclosure, it would have been obvious to one of ordinary skill in the art to create three treatment zones by optimizing the number of heat treatment zones divisible by the movable doors.

8. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Hagan (US 1362296) and Osamu (JP 05-239558) in view of Kuehn (DE 19919738 Machine Translation).

Neither Hagan nor Osamu disclose a closeable opening adjoined on both sides by vertically movable doors.

Kuehn, in disclosing a continuous furnace for the heat treatment of work pieces, such as a rotary hearth furnace, discloses an opening 4 for charging and

Art Unit: 1793

discharging which is adjoined by two doors as to form an enclosure (see Figure 1 and page 3 line 16-17).

It would have been obvious to one of ordinary skill in the art to include Kuehn's teaching of the adjoining of doors to a closable opening to the furnace of Hagan modified by Osamu in order to facilitate the conservation of temperature and pressure conditions of the adjoining heat treatment zones while creating a charging and discharging zone.

9. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Hagan (US 1362296) and Osamu (JP 05-239558) in view of Barkman (WO 86/02103).

Neither Hagan nor Osamu disclose the circumferential distance of the heating zone.

Barkman discloses an installation for the heat treatment of workpieces, such as a rotating hearth furnace, wherein the travel path of the workpiece charge is varied in order to achieve a particular heat treatment profile (see abstract, page 4 lines 19-29 and claim 1).

The travel path of the workpieces in Hagan's furnace modified by Osamu is varied by the heat treatment zones and their respective lengths. In applying Barkman's disclosure to Hagan's furnace modified by Osamu, it would have been obvious to one of ordinary skill in the art to optimize the length of the treatment zones by constructing a heating zone which extends over a circumferential distance of between about 90 degrees between the two closable openings in order to achieve a desired heat treatment profile.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTINE CHEN whose telephone number is (571)270-3590. The examiner can normally be reached on Monday-Friday 8:30am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/
Supervisory Patent Examiner, Art
Unit 1793

CC